Zeitschrift: IABSE structures = Constructions AIPC = IVBH Bauwerke
Band: 2 (1978)
Heft: C-4: Structures in the USSR

Artikel: A new type of a machine-building shop
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DOI: https://doi.org/10.5169/seals-15115

22. A New Type of a Machine-Building Shop

Design Institute: TSNIIproektstalkonstructsiya, USSR
Dimensions:
Bay: 120 m
Column spacing: 36 m
Shop height: 20 m
Steel grade for main structures: C 60/45; C 46/33
Mass:
Metal structures: 31'300 t
High-strength steels: 8'000 t
Steels of higher strength: 11'000 t

The building of the machinery shop has a 120 m-bay, the height (up to the roof) is 69 m, the length is 432 m. It is equipped with transverse bridge cranes of Q equal to 15 t which are located at el. 57.5 m, longitudinal semi-gantry cranes of Q equal to 32 t (el. 22.0 m) and gantry cranes of Q equal to 320 t. The building frame is a steel structure, the enclosure structures are lightweight, heated wall panels and roof panels. The roof is flat, without monitors.

The transverse structures have been designed as a single-span frame; the frame collar-beams have a rigid connection to columns and a rigid fixing of the columns in the foundations. (See Fig. 1) The frames are spaced at 36 m in a longitudinal direction. The trusses-crane girders spanned 120 m are used as the frame collar-beams. The bottom chords of collar-beams having a box section (2 x 3 m) are designed as supporting structures for the bridge cranes.

The collar-beams design being used made it possible to place the transverse cranes in an inter-truss space, to ensure a considerable lowering of the height and to provide an adequate operation of cranes all over the production area. Roof trusses (36 m span) made of high-strength steel pipes are supported on the top chord of the truss-crane girder.

Two advanced trends have been realized in the project: material concentration and combination of functions of the crane girders and the roof bearing structures. The columns 3 m wide are space structures consisting of two solid-web branches connected by a lattice. Rigidity in a longitudinal direction is secured by a frame-bracing system where the columns are rigidly connected to the longitudinal structures of the technological platform at el. 22.0 m and at the same time have a hinge connection to similar structures of the platform at el. 53.5 m. A cross space bracing is placed between these two platforms along the height of the building in one of the longitudinal column spacings. In three spans below el. 22.0 m knee-braces are provided which increase rigidity of the longitudinal structure lower tier.

The columns bases are designed on the basis of a misalignment erection of columns. The column base serves as a previously aligned member on which the column is positioned by a milled end.

The lattice of the truss-crane girder is flat and of I-beam section. Field joints of the lattice are made by high-strength bolts. Field joints of the truss bottom chord of a box section are welded. The bracing system for the roof includes lateral bracing in the plane of top and bottom chords of trusses as well as vertical bracing between them. The roof trusses are used as the struts for the system of bracing providing redistribution of top chords in the trusses-crane girders. The building structures have been designed to ensure erection by large units for the roof steel structures (120 x 36 m, weighing up to 950 t). All the structures are welded. The high-strength steels and steels of higher strength were used. (Steels "16Г2АФ", "10Г2С1", "14Г2").

The use of high-strength steels and steels of higher strength, new light-weight materials for the roof and wall enclosure structures, new advanced forms of structures and improved methods of their connections permitted to give a considerable reduction of the weight of steel structures by 22 per cent.

(G.B. Gordon, A.I. Petrakov)

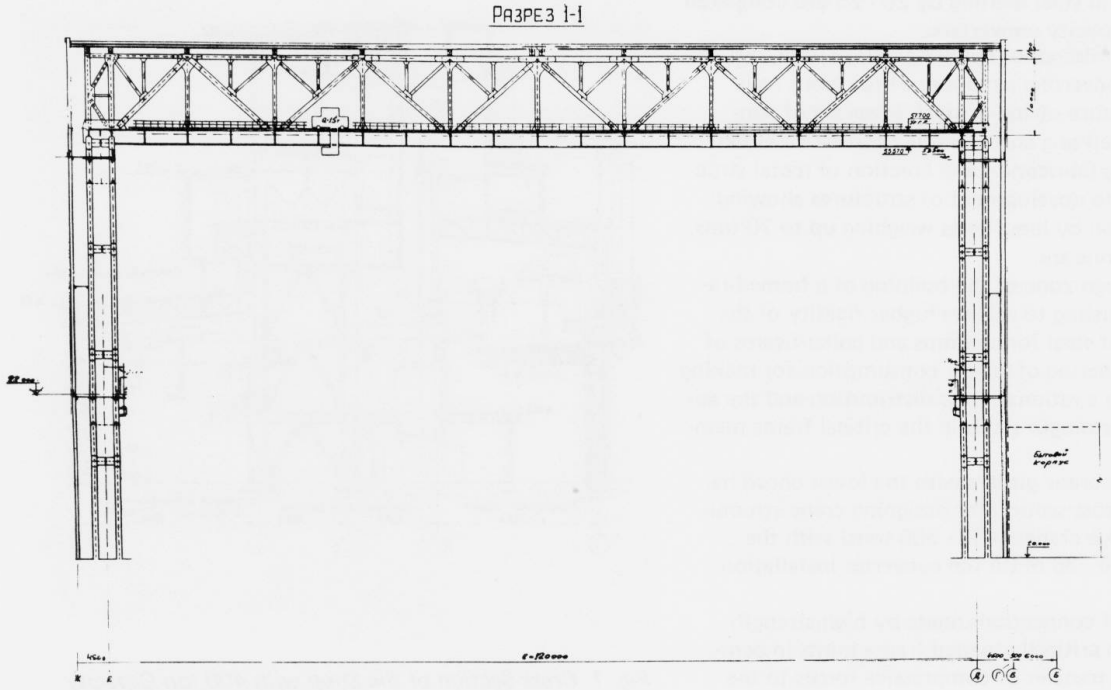

Fig. 1 Cross-sectional View